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(88) Date of publication of the international search report:
15 June 2000 (15.06.00)

(54) Title: *STAPHYLOCOCCUS AUREUS* GENES AND POLYPEPTIDES

(57) Abstract

The present invention relates to novel genes from *S. aureus* and the polypeptides they encode. Also provided are vectors, host cells, antibodies and recombinant methods for producing the same. The invention further relates to screening methods for identifying agonists and antagonists of *S. aureus* polypetide activity. The invention additionally relates to diagnostic methods for detecting *Staphylococcus* nucleic acids, polypeptides and antibodies in a biological sample. The present invention further relates to novel vaccines for the prevention or attenuation of infection by *Staphylococcus*.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/19726

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :C12N 15/31,15/66, 15/63, 1/21: C07K 14/31
US CL :536/23.7; 435/91.41, 320.1, 252.3, 69.1; 530/350

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 536/23.7; 435/91.41, 320.1, 252.3, 69.1; 530/350

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Genbank, Swissprot, PIR60, SPTREMBL9
search terms: sequences corresponding to SEQ ID NO: 2, 4, 6, 8, 10, 12, 14, 16, 18, and 20

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 843 016 A2 (SMITHKLINE BEECHAM CORPORATION) 20 May 1998, page 23 (relevant to instant SEQ ID NO:16).	1-11
X	EP 0 811 696 A2 (SMITHKINE BEECHAM CORPORATION) 10 December 1997, page 8 (relevant to instant SEQ ID NO: 12).	1-11
X	EP 0 826 774 A2 (SMITHKINE BEECHAM CORPORATION) 14 March 1998, Figure 1 (relevant to instant SEQ ID NO: 6).	1-11

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"B"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

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10 FEBRUARY 2000

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Form PCT/ISA/210 (second sheet)(July 1992)★

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/19726

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-11

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/19726

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING
This ISA found multiple inventions as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claim(s)1-11, drawn to Staphylococcal nucleic acids, proteins encoded by the nucleic acids, vectors comprising the nucleic acids, methods of making the vectors, cells comprising the vectors, and methods of expressing the nucleic acids in transformed cells.
Group II, claim(s) 12 and 13, drawn to an antibody and a cell producing an antibody, both antibodies being specific for the protein encoded by the nucleic acids of Group I.
Group III, claim(s) 16, drawn to a vaccine comprising a protein encoded by the nucleic acids of Group I.
Group IV, claim(s)17, drawn to a method of preventing an infection by administration of a protein encoded by the nucleic acids of Group I.
Group V, claim(s) 18, drawn to a Staphylococcal nucleic acid assay using the nucleic acids of Group I as probes.
Group VI, claim(s) 19, drawn to an assay of antibodies specific for Staphylococcal proteins using proteins encoded by the nucleic acids of Group I.
Group VII, claim 20, drawn to an assay of the Staphylococcal proteins of Group I using antibodies specific for the proteins of Group I.

The inventions listed as Groups I-VII do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Groups II-VII constitute the third product, and the second through fifth methods of use of the products of Group I. PCT Rule 13.1 and Annex B do not show that unity of invention exists between a first and second product or method of use.

This application contains claims directed to more than one species of the generic invention. These species are deemed to lack Unity of Invention because they are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for more than one species to be searched, the appropriate additional search fees must be paid. The species are as follows:

The amino acid sequences of the polypeptides shown in Table 1.

The claims are deemed to correspond to the species listed above in the following manner:

All claims of each Group discussed above are drawn to the species indicated above.

The following claims are generic: Claims 1-20

The species listed above do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, the species lack the same or corresponding special technical features for the following reasons: Each species is drawn to a different amino acid sequence, and to nucleic acids encoding different amino acid sequences. There is no disclosed relationship between the sequences of each individual species disclosed in Table 1.

Restriction to a single species has been waived sua sponte and the Applicants are permitted to have ten species examined without payment of additional fees. The Applicant's representative Kenley Hoover elected telephonically on 1/27/00 to have the sequences corresponding to SEQ ID NOS: 2, 4, 6, 8, 10, 12, 14, 16, 18, and 20 examined.